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BASIC INTRODUCTION TO GAME DESIGN

The formal systems of games and game design atoms

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PLAYER INTERACTION, RESOURCES, SYSTEMS | 7 COMMENTS

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Welcome to the second week of class in the course: **Basic Introduction to Game Design**. Make sure to read the syllabus and course information before you continue. Today, we are going to discuss the formal system structures of games (an introduction to its formal and dramatic elements) and game design atoms. This text follows closely from our textbooks (Game Design Workshop, Chapters 2 & 3 and Challenges for Game Designers, Chapter 2); it also takes inspiration from the Salen and Zimmerman book Rules of Play (Chapters 5,6,7). Keep in mind that game design is a field of practice and even when you are reading all the information from this course, there is no substitute for working on some games at home for practice.

The Definition of Games

For the late shift, here's me saying how everything can be a game. No, really.

<http://t.co/reYsNoyXso>

— *Raph Koster (@raphkoster)* April 17,
2013

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重试

Rather than pondering on the exact definitions of game here (many of which can be found in Rules of Play, Chapter 7), we want to look at what's most useful to us as game designers.

“Design is the process by which a designer creates a context to be encountered by a participant, from which meaning emerges.” (Katie Salen and Eric

Zimmerman)

This quote from the Rules of Play book encapsulates the main items that we should focus on as game designers: (1) **Context**, which can be the spaces, objects, story and behaviours that you encounter in games. (2) **Participants** are your players that act upon your game context for example via manipulation or exploration. They inhabit your game world to play. (3) **Meaning** is a concept that we have already mentioned last week when we talked about meaningful choice. When players take actions in your game, meaningful play should emerge from the agency that players feel. Meaning here is tied to the value of significance of something encountered in a game for the individual player. Even in real life, meaning is important to us because it helps us navigate through our world and interpret the people and the world around us. Our everyday interactions are essentially guided by meaning-making.

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重试

“Design is the successful application of constraints until only a unique product is left.” (Don Norman)

To develop a game, it is best to constrain ourselves at the start of our design process to some core elements of games. We begin by brainstorming elements that we find in all games. The results of such a brainstorm from class is shown below. However, as mentioned in the above Extra Credits video, there is no progress in exhaustively defining what exactly a game is. We simply use this as a starting point to wrap our head around the elements in games that we are going to work with as game designers. We have to start

somewhere to develop this new medium and this list serves as a good starting point.



What are the elements of a game?

When you are designing a game, an interesting approach to take is to think about your game's core first (this would be your core mechanic), the one particular pattern of actions that you want your player to take over and over again. The best way to think about cores, is to look at board games and take some common concepts from there (which are also listed in the Challenges for Game Designers textbook):

- **Territorial Acquisition.** These games are often zero-sum games, where the players fight over a limited amount of territory or resources. Think about Risk, for example.
- **Prediction.** Often you find this core in party games or gambling games and luck is involved in making a prediction. Roulette is an example of this.
- **Spatial Reasoning.** Often you need to consider how your game pieces work together to create a successful winning strategy. An example of this core is Tetris.
- **Survival.** This core banks on our natural instincts to survive and is found in many action games. An example is Dark Souls.
- **Destruction.** A game with this core allows players to wreck havoc on most things in the game. It is very common in first-person shooters.
- **Building.** The building and use of structures is a core of many games. Good examples are Sim City and Minecraft.
- **Collection.** The need to collect, own and match things is deeply ingrained in humans. This is a popular core mechanic in many board games and casual games (Match 3).
- **Chasing or Evading.** This appeals to our fight-or-flight response and often works as a driving core in games. An example is Pac-Man.
- **Trading.** This is a very cooperative game core. Sometimes, players want to exchange resources and negotiate the values with one another. The most common example is the board game Settlers of Catan.
- **Race-to-the-end.** This core dynamic is very simple to

implement and you have already created a Race-to-the-end game in your first homework assignment. It is very common in children's games.

Games as Systems

*A game is a closed formal system that subjectively represents a subset of reality.
(Chris Crawford)*

We have already identified games as a space that exists as a subset of reality with boundaries and rules (we have even mentioned the concept of the magic circle in class, see below for an extra credits video on the concept).

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重试

Games can be seen as sets of elements, but they are much more than just a set, often having internal relationships and states of elements that help them interact. At this level, it is most sensible to refer to games as systems. Now, systems can be seen as sets of items that can affect one another. The interaction among these set items can form patterns that are distinct from its individual parts (i.e., the whole is greater than the sum of its parts). Littlejohn and Foss discuss four system elements that are mentioned in Rules of Play (p.51) as well:

1. **Objects.** This refers to elements, variables or parts of a system. These could be physical and/or abstract in nature.
2. **Attributes.** These are the properties or qualities that a system and the objects within the system can have.

3. **Internal relationships.** The objects in a system are usually in an internal relationship to one another.
4. **Environment.** Systems are influenced by the context that surrounds them.

Games can be framed as different forms of systems as well, such as *formal, cultural or experiential systems*. If you analyse a game as a formal mathematical system, you analyse it differently than if you analyse it as a cultural or experiential system. These systems are often embedded in one another. A cultural system encompasses the experiential and formal system of a game. The main difference between framing games as a formal or as an experiential system is that formal systems are closed (they can be analysed independent from their environment) and experiential systems can be closed but also open (i.e., they have some form of exchange between the system and the environment).

The easiest way to start seeing games as systems and to uncover their shared properties is to look at two games and compare them in terms of their commonalities and differences (see exercise 2.1 in the Game Design Workshop textbook, Chapter 2, p.29). If you have read the textbook chapter, you will already be familiar with the elements mentioned below.

Formal Game Elements

“Playing a game is the voluntary effort to

overcome unnecessary obstacles.”
(Bernard Suits)

Before we start: **Quick optional exercise:** Redesign Tic-Tac-Toe for 3-5 players. This means you are likely to change the game tokens (Xs and Os) and possible the grid size. Feel free to change any other elements of the game to achieve this. Feel free to blog about this process (i.e., your new rule set and redesign) and post your blog as a comment to this blog post. There are no course XP for this.

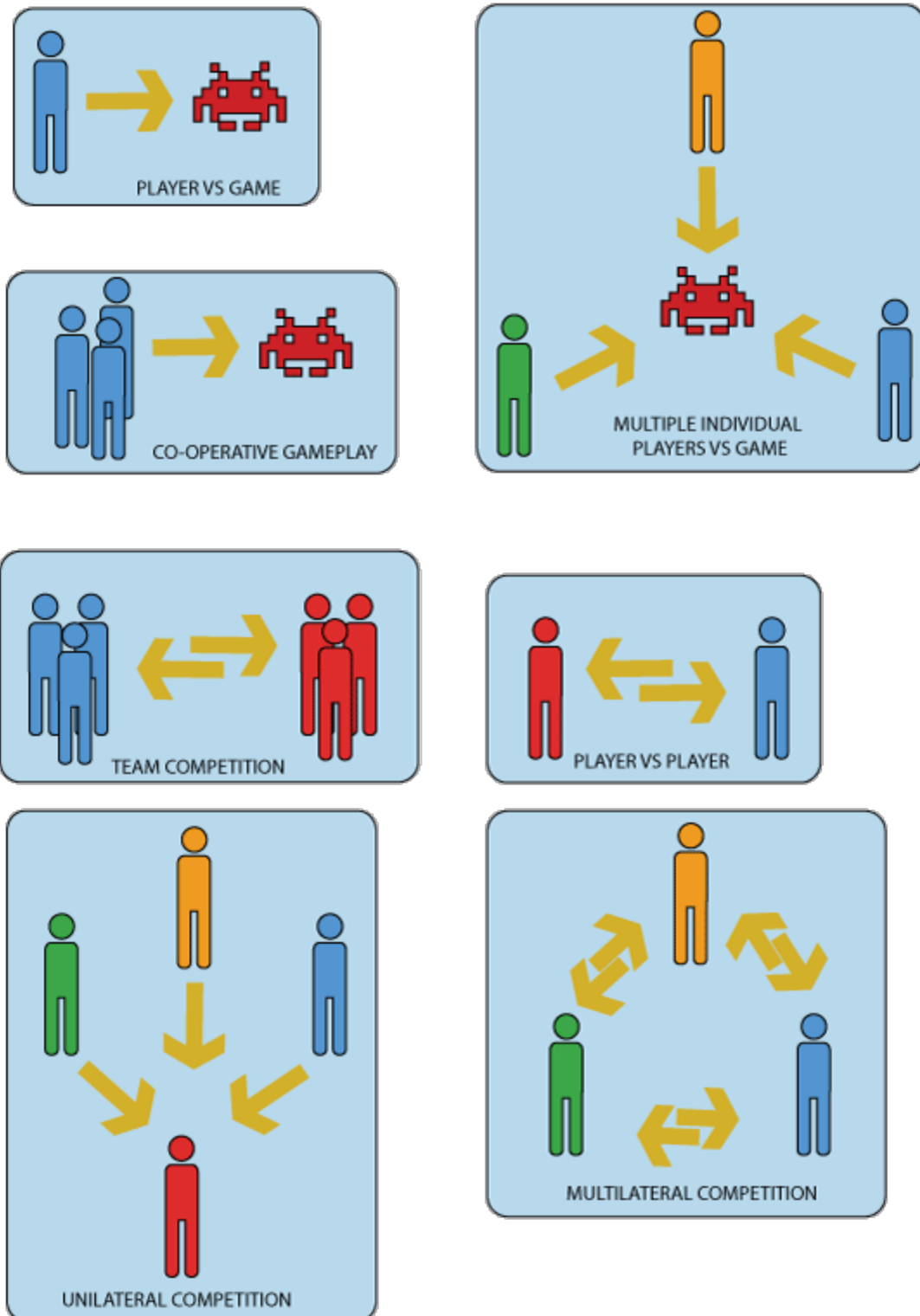


Formal elements help create a game's structure. The relationship

between these formal elements is what forms a game. Therefore — as game designers — we have to get acquainted with these formal game elements. This is not an exclusive list of game elements and by combining them, it is possible to create different game elements as well as novel forms of interaction and gameplay. With these tools, you will hopefully be able to create meaningful decisions in your own games.

1. **Players.** Game design calls for players to interact with one another and the game system. Players are voluntary, active participants in the entertainment activity. They partake in it, they consume it and they are invested in it. They can be potential winners of the activity. When players adopt the *lusory* attitude, they can enter the Magic Circle of games and immerse themselves in the game world. This means that there is usually an invitation to play, such as recognizable rituals or social offerings for playing. The invitation to play is important for players to have a lusory attitude. The number of players can be variable or fixed for a game. Players will have different experiences based on the amount of other players partaking in a game. Different players can adopt different roles during play. Players can play in teams and define actions for team members. Within role playing games, a player role can facilitate or inhibit a player action, but often players have different play styles, which allows for different matches even when players play the same role. An overview of different player interaction patterns is shown below (and can be found in your Game Design Workshop

textbook).



Different player interaction patterns commonly found in games (according to your Game Design Workshop textbook)

2. **Objectives.** As we have already mentioned in the last lecture, objectives are important for the motivation of your players to engage in gameplay. The best game goals seem attainable but are still perceived as challenging. You want to be able to work as hard as necessary to achieve your own objectives as a player in a game. Examples are getting the most XP at the end of a game or staying alive until the end of the level. The player's need to complete objectives serves as a measure of player involvement in games. Your textbook discusses the following objective types in more detail:

1. **Capture.** Players have to avoid getting captured or killed while destroying some opponent properties (commonly some form of terrain or units).
2. **Chase.** Players have to elude or catch an opponent.
3. **Race.** Players have to reach a goal before anyone else does.
4. **Alignment.** Players have to align their pieces in a spatial or conceptual configuration.
5. **Rescue** or **Escape.** Players have to get some defined units or items to safety without being compromised.
6. **Forbidden Act.** Players have to get the opponents to break the rules or to abandon a strategy.
7. **Construction.** Players have to construct, maintain, or manage game objects.
8. **Exploration.** Players have to explore unknown game areas.
9. **Solution.** Players have to solve a problem or puzzle (sometimes before the opponents solve it).
10. **Outwit.** Players have to gain and use knowledge to outwit

their opponents.

3. **Procedures.** These are actions or methods of play allowed by a game's rules. They can be specific instructions of what actions to take during play. They can also refer to a specific set of controls. In a computer game, they would serve to process the input of a player. Procedures can specify actions that are impossible or inefficient outside of the magic circle of the game. Essentially, you have to answer who does what where and when and how? Player actions as specified by procedures can be split up into the following:

- *Starting* (How the game is put into play, also leading into onboarding of players)
- *Progression* (These are the ongoing procedures running during gameplay)
- *Special* (These are actions that are only available based on other elements and changes to the game state)
- *Resolving* (These actions bring your game to an end)

4. **Rules.** These are the exact objects and concepts of your game; they are the building blocks of the game system. As a game designer you want to be able to describe the actions for all possible situations in your rule set. Your rule set specifies everything a player *can* and *cannot* do. This means that you often have to limit the actions a player is allowed to do and you have to think about reactions of the game to player actions. Rules are the authority of your game world. They are like a code of honour that players adhere to when entering play (this is tied to the *lusory attitude* of being willing to enter the *magic circle*). If players

don't follow the rules, they are leaving the game. In summary rules serve three main purposes:

1. Defining objects and conditions
2. Restricting player actions
3. Determining effects on players

5. **Resources.** These are game objects that have a value for players in reaching their individual objectives. The value of these items can be determined by their **scarcity** and **utility**. The value for players (i.e., utility) is often scaled by how much an item helps a player achieve a goal. As a designer you control the availability (i.e., scarcity) of an item. You can help guide the player to find resources and you can put systems in place that govern how resources are managed and when they become scarce. Common resource examples in games are:

- Lives
- Units
- Health
- Currency
- Actions
- Inventory
- Time

6. **Conflict.** Conflict emerges through procedures and rules in the game that prevent a player from achieving their goal. Objectives often guide players to these conflict situations. The main conflict in many first-person shooters is to stay alive while player or non-player characters try to kill you. The conflict in Pinball would be to keep the ball from rolling out of the playing field only with the

mechanical devices (often flippers) the machines provides to you.



Conflict emerges when objectives guide players toward rules and procedures that work against the player goal.

Three types of conflict are common in games:

1. **Obstacles.** These can be in physical or mental form. Physical obstacles could be the length of your Pinball flippers or the bumpers that the ball bounces off of. Mental obstacles can be a missing item to complete a riddle in an adventure game or the challenge of calculating the right numbers in Sudoku.
2. **Opponents.** Other players in a game or computer-controlled enemies.
3. **Dilemmas.** These are problematic choices that a player is faced with. It's a strategic decision, where the consequences have to be weighted before proceeding.

7. **Boundaries.** This is Sparta. 😊 No, just kidding. This is the border to the real world (the separation of the magic circle and real world). This also relates to actions that are only possible in a game but would have much different consequences outside the game boundaries. It can also relate to the playing field, the skybox, or other limiting geometry in your game world.
8. **Outcome.** The outcome of a game has to be uncertain to foster player interest. In games the outcome is often measurable (e.g., points) and uneven (i.e., one team/person has to win). Winning conditions are different from player objectives. Since players have invested much time and emotion into a game, it is hard to create a resolution that satisfies this investment of players.

“Every game is its rules – for they are what define it.” (David Parlett)

Game Atoms

*“A game is a context with rules among adversaries trying to win objectives.”
(Clark C. Abt)*

Along the lines of core elements of a game, our other textbook (Challenges for Game Designers) defines the smallest possible

design element as a game atom. These game atoms are broken down into:

- **Players/Avatars/Game bits.** Players set the rules of the game in motion and often have some form of representation in the game world (e.g., tokens or pawns). Some games don't have representations and the player represents themselves.
- **Objectives/Goals.** Often referred to as missions or quests, they are like a task list for your player telling them what they should be working toward.
- **Rules/Mechanics.** In games, mechanics determine *how* something works, much like game rules do. They are about the possibilities for the players that will change the game state. Rules are the most defining quality of games. The following are general properties of rules:
 - limit player actions
 - explicit and unambiguous
 - shared by all players
 - fixed
 - binding
 - repeatable
- **Resources.** See above.
- **Game States.** The state of the game system at one point in your game loop. Essentially everything that you would write into a save file. A collection of all relevant variable game information that changes during gameplay.
- **Game Views.** Different stages of the game may allow a player to

see different information. The parts of the game state that are visible to a player are called the game view.

- **Information.** All the information necessary to play the game.
- **Sequencing.** The order in which rules unfold, similar to turns in a board game. This is important for thinking about when the information in a game changes (and with it the current game state).
- **Player Interaction.** The types of interaction allowed for players.
- **Theme/Setting.** While a setting is not mandatory for games, many games have some sort of theme that helps players to make sense of game information. It is what the game is all about. This can refer to things such as colour, theme, story or narrative. It helps players feel more at home with your game mechanics.

Homework Assignment

“The great thing about design is that we can do what we want. There are no immutable design rules that we must always follow as we create our games.”
(Eric Zimmerman)

Broken Game Modification

This is based on Eric Zimmerman's design exercises. Use your GDW groups for this assignment. Don't worry if you are not in the same tutorial timeslot, because the assignment will be handed in via Blackboard. At least one person in your GDW group must inform the TA of your GDW group members and submit the assignment in Blackboard. You should also attach a list of group members to your submission.

1. Choose and play one of the following "broken" games in your GDW group:
 1. **Rock Paper Scissors**
 2. **Up-to-20 Dice Game.** Roll a die, add number to your total score, and pass it on to your left. Winning condition: The first player reaching 20 points wins.
 3. **I Spy**
2. Now, try to analyze the core mechanic and uncover what might be broken in this game.
3. Design a variation of the game that fixes the broken aspects of the game design you identified. Be careful to only design a modification and not an entirely new game (e.g., an outside observer, who knows nothing about the new game, should be able to recognize the new design as a variation of the original game).

You need to submit the following in Blackboard (all in one zipfile with your group name – game name) for this assignment:

- A title page that includes all the names of the people in your team and a summary that gives an overview description of your game in a couple of sentences
- A set of complete and edited game rules for your game modification
- 4-8 photos of the game being played
- A design process statement – a 1-page max description of your group's process in getting to the final design
- Peer ratings (Rate the contribution of each of your team members, identified by firstname lastname, on a scale of 1 [done nothing] to 10 [gone above and beyond for this assignment])
- The actual game materials (cards, board, pieces) if you have them in digital form. (If you only have them in physical form, make sure to submit to either one of your TAs in the tutorial.)

Further Reading

If you are going for that A+, this is your necessary background knowledge.

1. Chapter 2 and 3 of Game Design Workshop. Tracy Fullerton.
2. Challenges for Game Designers. Chapter 2. Brenda Brathwaite and Ian Schreiber.
3. Rules of Play. Chapters 5,6,7. Katie Salen and Eric Zimmerman.
4. Level 3: Formal Elements of Games. Ian Schreiber (2009). Game Design Concepts.
5. Formal Models and Game Design. Stefan M. Grünvogel (2005).

Game Studies 5(1).

6. Formal Abstract Design Tools. Doug Church (1999). Gamasutra.

7. I Have No Words & I Must Design. Greg Costikyan (1994).

Interactive Fantasy 2.

8. In-Depth with Meaningful Choices. Riot Meddler/Andrei van Roon (2014). League of Legends Dev Blog: The Design Values of League of Legends.

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重试

Student Feedback

*Just a heads-up for any potential readers,
I've posted a new entry (Skyrim, this
week) on my gaming journal blog:
<http://t.co/cauppLr4L6>*

*— Samantha Stahlke (@samanthastahlke)
[September 12, 2014](#)*

*[@acagamic](#) Very interesting webinar I
found a while back. It's long but worth the
view. Got me into game design.
<https://t.co/4CeY3PE7y7>*

*— Deryk Thuss (@Deek2295) [September
15, 2014](#)*



7 thoughts on “The formal systems of games and game design atoms”

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